

DETERMINATION OF CYCAS GENERA AS SUGGESTED BY LEAF EPIDERMIS STRUCTURE

By

P. GREGUSS

Director of Institute for Botany of the University, Szeged, Hungary

We hope to offer some help to botanists dealing with recent *Cycadaceae* but also to paleontologists, when attempting to determine the individual genera by the structure of leaf epidermis on the basis of the following key of determination and two photo-plates. The magnification of the leaves of characteristic representatives of the individual genera (both from surface and back side) is uniformly 300 \times .

1. Both on surface and back side of the leaf the walls of the \pm isodiametrical epidermis cells are subtly perforated, on the back side of the leaf the stomatal apertures irregularly arranged, side walls of epidermal cells in some cases somewhat uncinately curved,

Cycas (Plate I. Figs., 1, 1a, 2, 2a)

- 1a. The walls of the epidermal cells are not perforated, stomata on the back side of the leaf are arranged in narrower or broader strips or scattered.
2. The surface of the epidermal cells is covered with radial cuticular lathes arising from centres; all walls of epidermal cells are strongly undulated, their bulging attaining even $\frac{1}{3}$ of the cell lumen; on the back side of the leaf stomata are scattered

Stangeria (Figs, 4, 4a)

- 2a. No emerging cuticular lathes on the surface of epidermal cells, lateral walls even or hardly undulated, on the back side of the leaf the stomata are arranged in narrower or broader strips.

3. Amphistomatal leaf; on the surface of the leaf the stomatal apertures are scattered, there are 0 to 5 stomata per sq. mm., on the back side they are arranged in strips of 6 to 8 rows, 55 to 60 stomata per sq. mm.; epidermal cells elongated in the direction of the veins; they are 2 to 10 times longer than wide.

Bowenia (Figs. 5, 5a)

* Detail of the author's work: Xylotomy and leaf epidermis of recent *Cycadaceae*, in preparation now.

- 3a. Stomata, if occurring on the leaf surface, are gathered both here and on the back side in narrower or wider strips.

.....4.

4. On the leaf surface thin and thick walled epidermal cells are generally short oblongs or ham-shaped, 2 to 5 times longer than wide, lateral and transversal walls somewhat undulated and arranged in parallel rows in the direction of the veins; guard cells of stomata sunk, above them the crateriform apertures circular or elliptic, in most cases arranged perpendicularly to the longitudinal axis of the elongated and hexagonal guard cells. The number of the lateral cells is 4 to 6.

Dioon (Figs. 6, 6a)

- 4a. On the leaf surface the epidermal cells are considerably elongated in the direction of the vein, or if they are \pm isodiametric they are arranged in uniseriate longitudinal rows, walls being thick or thin.

.....5.

5. Epidermal cells are 5 to 20 times longer than wide, very thick-walled; the cavity sometimes split shaped, among two or three thick-walled long cells quite short rows of 3 to 7 thin-walled cells of varied shape proceed. The number of the lateral cells in generally 2 to 4 (8), the stoma sometimes amphicyclical.

Ceratozamia (Plate II., Figs. 9, 9a)

- 5a. The walls of the epidermal cells both on the surface and on the back side are generally thin or moderately thick, 5 to 10 times as long as wide, of

varied shape, the wall edges undulated, the ends of the lateral cells next to the guard cells swallow-tailed-elongated, in some species the guard cells sunk, number of lateral cells mostly 4, Some species are amphistomatal.

Zamia (Plate II. Figs. 12, 12a)

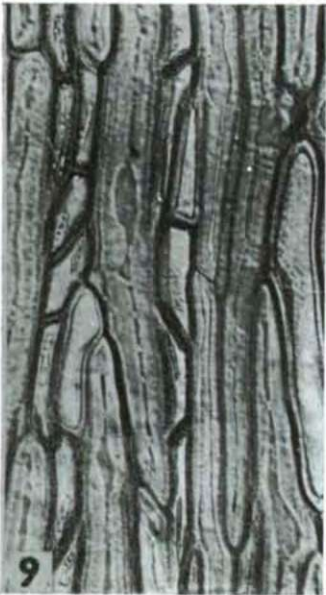
- 5b. The thin-walled epidermal cells are 2 to 5 times as long as wide, the lateral and terminal walls slightly undulated, stomata arranged in 1 to 5 longitudinal strips, the intervals between the strips having about the same width, on the back side the guard cells are about twice as long as wide, in their thick wall a design perpendicular to the axis; the number of the lateral cells is 2 to 4.

Microcycas (Plate I. Figs. 3, 3a)

- 5c. On the leaf surface the epidermal cells are thick-walled, generally short, isosceles and equilateral triangles, squares, trapezoidal, and generally arranged in uniseriate longitudinal rows; in other cases they are 2 to 10 times as long as wide, the walls then being thin, the stomata sometimes sunken; in such cases the lateral cells vaulting over the guard cells. The number of the lateral cells is 4 to 6. Some of the species are amphistomatal.

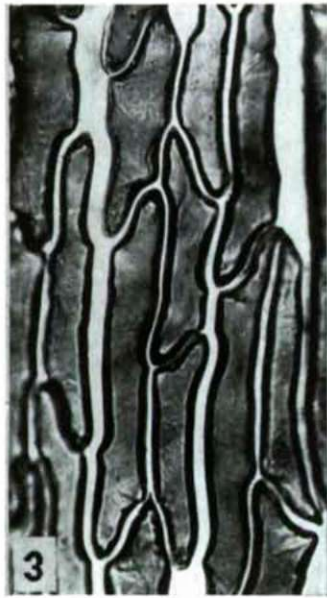
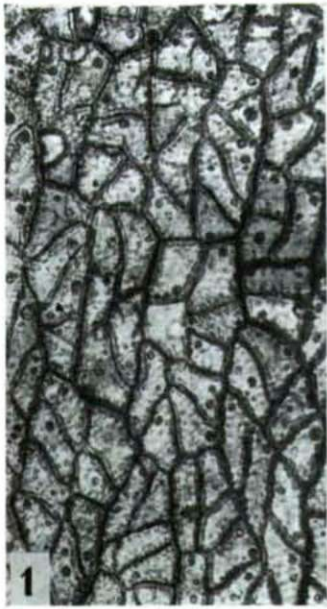
Macrozamia, (*Lepidozamia*) (Figs. 8, 8a, 10, 10a, 11, 11a)

- 5d. The epidermal cells are generally isodiametrical; the walls in such cases are very thick and only in some species 2 to 6 times as long as wide; the walls



Phot. Greguss

Determination of *Cycas* genera



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then are thick or thin, stomata gathered in narrower or broader strips; the number of the lateral cells 2 to 4 to 6, generally vaulting crater-shaped over the guard cells. In some species the leaves are amphystomatal.

Encephalartos (Plate II., Figs. 7, 7a)

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